



Real estate prices and bank stability

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ABSTRACT

Real estate prices can deviate from their fundamental value due to rigid supply, heterogeneity in quality, and various market imperfections, which have two contrasting effects on bank stability. Higher prices increase the value of collateral and net wealth of borrowers and thus reduce the likelihood of credit defaults. In contrast, persistent deviations from fundamentals may foster the adverse selection of increasingly risky creditors by banks seeking to expand their loan portfolios, which increases bank distress probabilities. We test these hypotheses using unique data on real estate markets and banks in Germany. House price deviations contribute to bank instability, but nominal house price developments do not. This finding corroborates the importance of deviations from the fundamental value of real estate, rather than just price levels or changes alone, when assessing bank stability.

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1. Introduction

Sustained imbalances in real estate markets can jeopardize the soundness of the financial sector, due to banks' central role as mortgage lenders and the frequent use of real estate as collateral (Goodhart and Hofmann, 2007). Corrections of real estate prices have preceded financial crises in the past, so policymakers often assess financial sector vulnerability on the basis of property prices, among other indicators (IMF, 2003).¹ We address the questions of whether and how deviations from fundamentals in the real estate sector transmit to the (in)stability of banks.

Inherently frequent and persistent deviations from fundamental values in real estate markets are central to the *real estate-financial fragility nexus*. In a frictionless world, property (just like any other asset) is priced by discounting expected cash flows, which in this case depend on demand and supply for real estate. The latter depend on macroeconomic fundamentals, such as population growth, real income, or wealth. House prices then should reflect economic cycles (e.g., Herring and Wachter, 1999; Higgins and Os-

ler, 1999; Collyns and Senhadji, 2002; Leamer, 2007) But this relationship is likely to be muted for three main reasons. First, real estate involves nonstandardized assets that differ in quality and are (regionally) segmented. Second, the absence of central trading places implies imperfect information and price negotiations that both lack transparency and involve high transaction costs. Third, supply responses in the housing market are sluggish due to construction lags and limited land availability (McCarthy and Peach, 2004). As a result, sustained deviations from long-run equilibria are more likely in the housing market, relative to financial markets (Herring and Wachter, 1999).

Theoretical studies assign the banking sector a crucial role in fueling such deviations. The so-called *financial accelerator* mechanism consists of two offsetting effects of house prices on bank stability (Kiyotaki and Moore, 1997). Increasing house prices boost bank capital by increasing the value of the real estate owned by the bank and the value of any collateral pledged by borrowers. In particular, real estate price appreciation discourages sub-prime mortgage borrowers from defaulting (Daglish, 2009). Thus, increasing real estate prices should reduce the riskiness of banks' assets and decrease the likelihood of financial distress in the banking sector (Niinimäki, 2009). This *collateral value* hypothesis suggests that increasing real estate prices enhance bank stability and predicts a negative relation between nominal house price changes and the bank's probability of default (PD).

Alternatively, soaring house prices could fuel the accumulation of risks by banks due to moral hazard and adverse selection

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¹ As in the United States (late 1980s), Scandinavia (late 1980s), Mexico (early 1980s), Japan (early 1990s), and Southeast Asia (1998) (Hilbers et al., 2001; BIS and IMF, 2005).

problems (Bernanke and Gertler, 1995; Allen and Gale, 2001). Rising house prices and the lower (perceived) risk of real estate financing can induce excessive lending to risky real estate borrowers at unreasonably low rates. Rising house prices also can encourage the riskiest investors to bet on further price increases and demand credit from banks. Both factors lead to larger exposures and the accumulation of risky assets, which are prone to mispricing. Reversals in fundamentals then increase the odds of financial distress in the banking system.² This *deviation* hypothesis suggests that larger departures of house prices from their fundamental value increase the bank's PD.³

This paper tests these two competing hypotheses empirically using detailed data on regional real estate prices and individual banks in Germany for 1995–2004. In doing so, we seek to address three important challenges that have plagued previous empirical work on the relation between real estate prices and banking stability: the comparability (or lack thereof) of real estate properties across markets in cross-country studies (e.g., Hilbers et al., 2001; Holly et al., 2007), the need to account for deviations in house prices from fundamentals rather than focusing solely on price level developments in regional markets (Calomiris and Mason, 2003; McCarthy and Peach, 2004; Ayuso and Restoy, 2006), and absence of bank-level evidence about distress conditional on real estate imbalances and other bank-specific characteristics for all financial institutions in a banking system (Harrison and Ragas, 1995; Haynes and Thompson, 1999; Guo, 1999; Gan, 2004).

Regarding the first challenge, aggregate studies use house price indicators and other macroeconomic data to predict crises (e.g. measured by Kaminsky and Reinhart (1999)). This approach largely ignores the inherent heterogeneity of immobile real estate assets across countries (BIS and IMF, 2005). In addition, the frequent neglect of regulatory differences, such as real estate financing schemes, tax laws, or the use of real estate as a collateral, seem inadequately reflected in general international house price indices, which are often based on only a few observations in some major cities of the sampled countries (Davis and Zhu, 2005; Hilbers et al., 2008). We take the regional variation of house prices into account when measuring their dynamics and deviation from fundamental value, using annual information on real estate prices in 125 German cities, consistently collected by the data provider Bulwien AG. Price developments vary across Germany's regions due to structural disparities in economic development and population growth rates, and they are likely to have differential effects on bank stability.

Second, the crucial role of banks as financiers is often grossly simplified in regional studies, which merely include foreclosure rates (Calomiris et al., 2008). We use detailed data about bank distress signals, obtained from the Bundesbank, in conjunction with other financial indicators to measure distress directly at the bank level. Previous microeconomic evidence relating real estate market developments more directly to individual banks is mostly limited to specialized intermediaries such as thrifts (Guo, 1999; Gan, 2004), savings and loan associations (Harrison and Ragas, 1995), or building societies and cooperatives (Haynes and Thompson, 1999). However, Davis and Zhu (2005) point out that nonspecialized banks are also exposed to the real estate market, because of either their indirect links through corporate customers that use real estate as collateral or their own direct lending. Therefore, we

consider the relation between real estate markets and distress of both specialized and universal banks. Using the bank distress database of the Deutsche Bundesbank, we can directly estimate PDs for individual banks, conditional on house price developments in the region where the banks are located. Thus, the financial distress measure we use is more precise than the common aggregate macro indicators.

Finally, we introduce a direct measure of real estate market imbalances. Because increasing prices alone can have both positive and negative effects for bank stability, as theorized by the *collateral value* and *deviation* hypotheses, the convention of merely specifying real estate price levels or changes seems inadequate.⁴ Instead we recognize that deviations from fundamentals create potentially hazardous imbalances at financial institutions. We therefore, calculate the deviation of house prices from their fundamental value, determined by regional macroeconomic variables, instead of relying on aggregate house price indicators at the country level. We estimate the difference between regionally observed house prices and their fundamentals across groups using the pooled mean group estimator suggested by Pesaran et al. (1999) and recently applied by Kholodilin et al. (2008).⁵

Despite the absence of a rapid increase of average house prices in Germany, regional house prices frequently deviate from the fundamental values determined by income per capita and population growth. Deviations from these fundamental values in 78 economic agglomeration areas appear quite dispersed. This regional disparity plays an important role in determining bank PD, because deviations of house prices from their fundamental value increase the PD of banks operating in these regional markets. In contrast, we do not find a significant association between nominal house price changes and bank PD. This result underscores the importance of assessing not only price-level developments, but also their relation to the underlying real economic circumstances in specific real estate markets. Although the fairly restrictive degrees of freedom, due to the short sample period, permit only a parsimonious model of real estate prices, our results are robust against the inclusion of additional regional covariates and random and fixed effects in the bank stability equation. Therefore, policies designed to react to house price developments must be considered with particular care, because a proper assessment requires the prior estimation of real estate market deviations from equilibrium. Empirical research on determinants of real estate imbalances based on longer time series, therefore, would be welcome.

The remainder of this paper is structured as follows. We introduce the empirical methodology and data to measure disequilibrium in the real estate markets and the relationship between house prices and bank distress in Section 2. Section 3 provides estimation results and robustness checks. The last section concludes.

2. Methodology

2.1. Deviations of real estate prices from fundamental value

Theoretical models of the determinants of real estate prices emphasize the trade-off households face in their decision to purchase a house. Their demand for housing relates positively to their

² The theoretical model proposed by Von Peter (2009) emphasizes the role of falling asset prices as the main drivers of bank distress. This view contrasts the logic of an earlier generation of bank run models, in which changes in the liability structure of banks triggered financial instability.

³ Gerlach and Peng (2005) provide empirical evidence for Hong Kong, where tight prudential regulations and risk controls were essential to limit the exposure of the banking sector to distress following downward price adjustments in real estate markets.

⁴ Oikarinen (2009) provides empirical evidence from Finland suggesting that there is a strong two-way interaction between real estate prices and the volume of mortgage loans. The author argues that this relationship fuels cyclical deviations of real estate prices from their fundamental value and may increase the fragility of the financial sector.

⁵ McCarthy and Peach (2004) and Ayuso and Restoy (2006) suggest as an alternative models of real estate (dis-)equilibria that emphasize the role of real estate price-to-rent ratios, but they report contrasting findings. The former indicate that US real estate markets were not overheated, whereas the latter find an overvaluation of 10%. Our results using price-to-rent ratios are available on request.

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